

Network Virtualization for the Enterprise Data Center

Guido Appenzeller
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THE ENTERPRISE DATA CENTER

Major Trends change Enterprise Data Center Networking

Trends in the Data Center

Old News: Server Virtualization

- Example statistics (financial Institution):
 - 35% of servers virtualized (> 50% in 3 years)
 - > 60% of new installs are virtualized
- Networking is now split across Hypervisor and Physical switches
- Applications teams want control over their virtualized infrastructure
- Trend towards private clouds: self-service provisioning of virtual servers and networks

Traffic Patterns change Bandwidth Demand

- Clustered workloads and multi-tier applications require much higher east-west bandwidth

Scale changes

- Large organization are facing VLAN exhaustion and broadcast scaling issues

New Networking Requirements

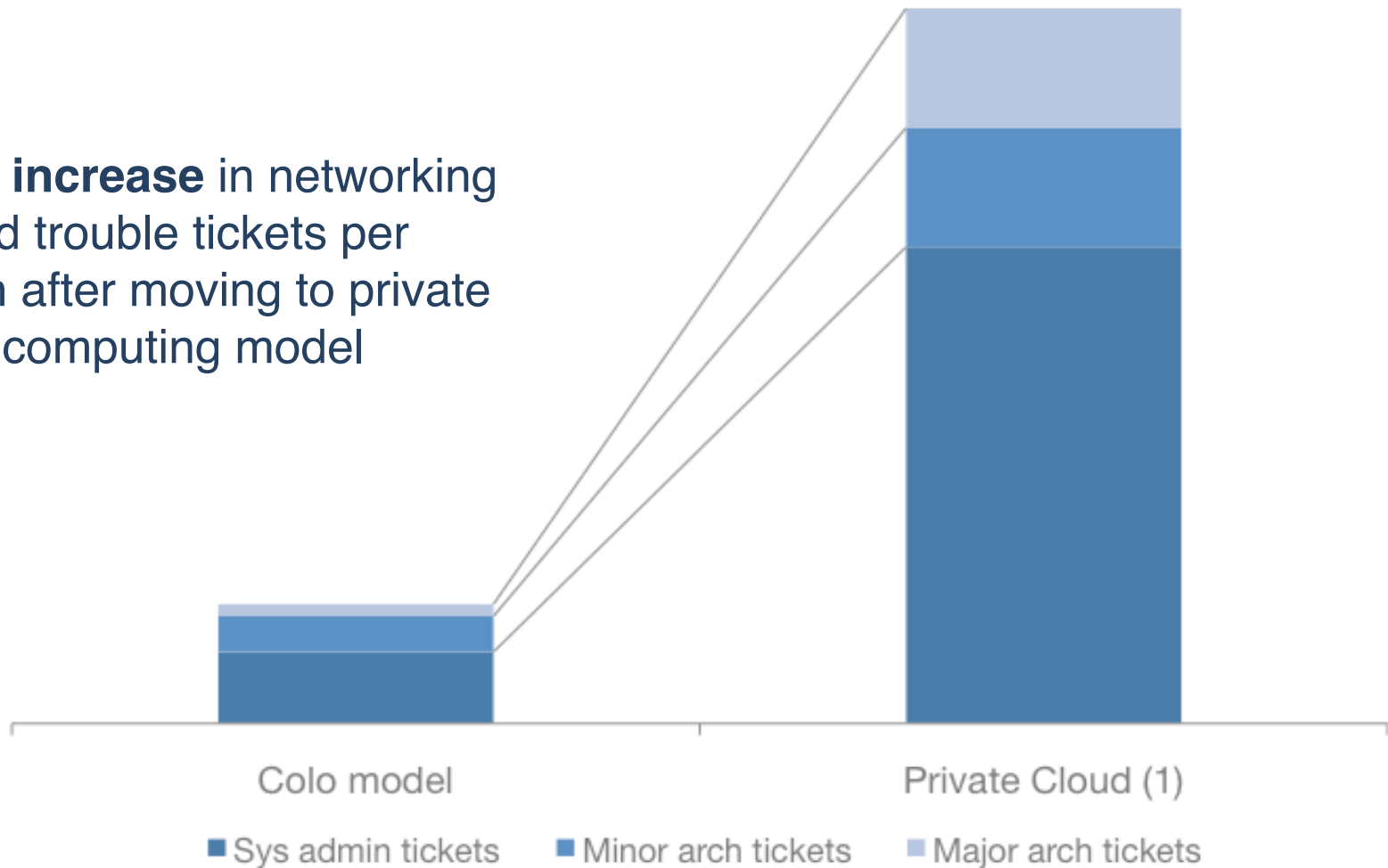
Network Virtualization

- Virtual networks to match virtual servers
- Delegate administration for virtual networks
- APIs for integration with provisioning systems
- One control/management plane for hypervisor and physical switches
- Non-tree topologies (leaf/spine, Clos Networks)
- Broadcast domain isolation

NETWORKING AND SERVER VIRTUALIZATION

The hidden headaches of moving to private cloud

~3-6x increase in networking related trouble tickets per month after moving to private cloud computing model



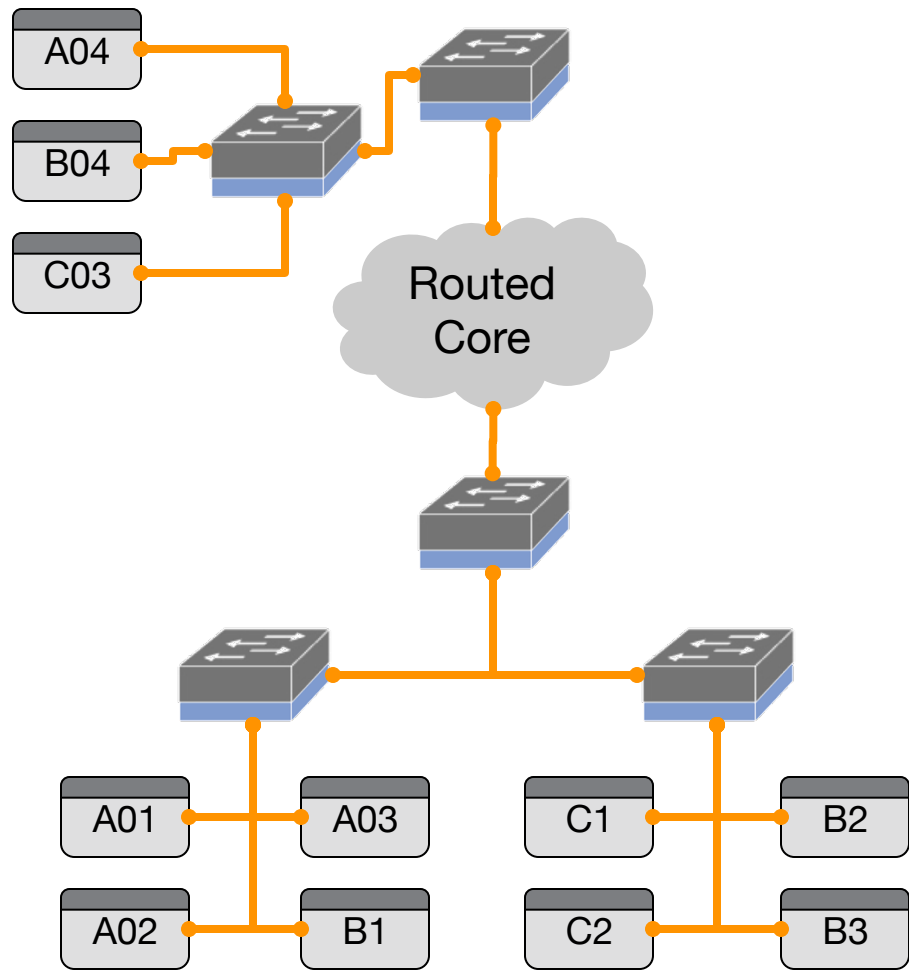
*“Virtual-Networking” Is as Meaningless a
Term as “Cloud” Now.*

Packet Pushers Blog

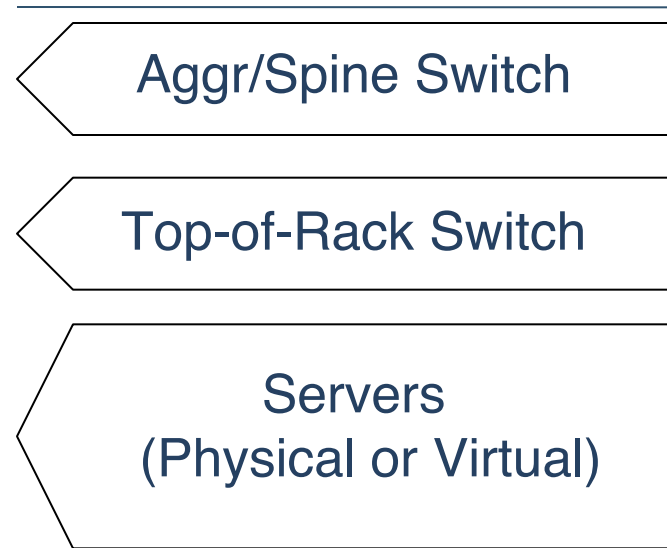
NETWORK VIRTUALIZATION

Example: Enterprise Data Center

Physical Network



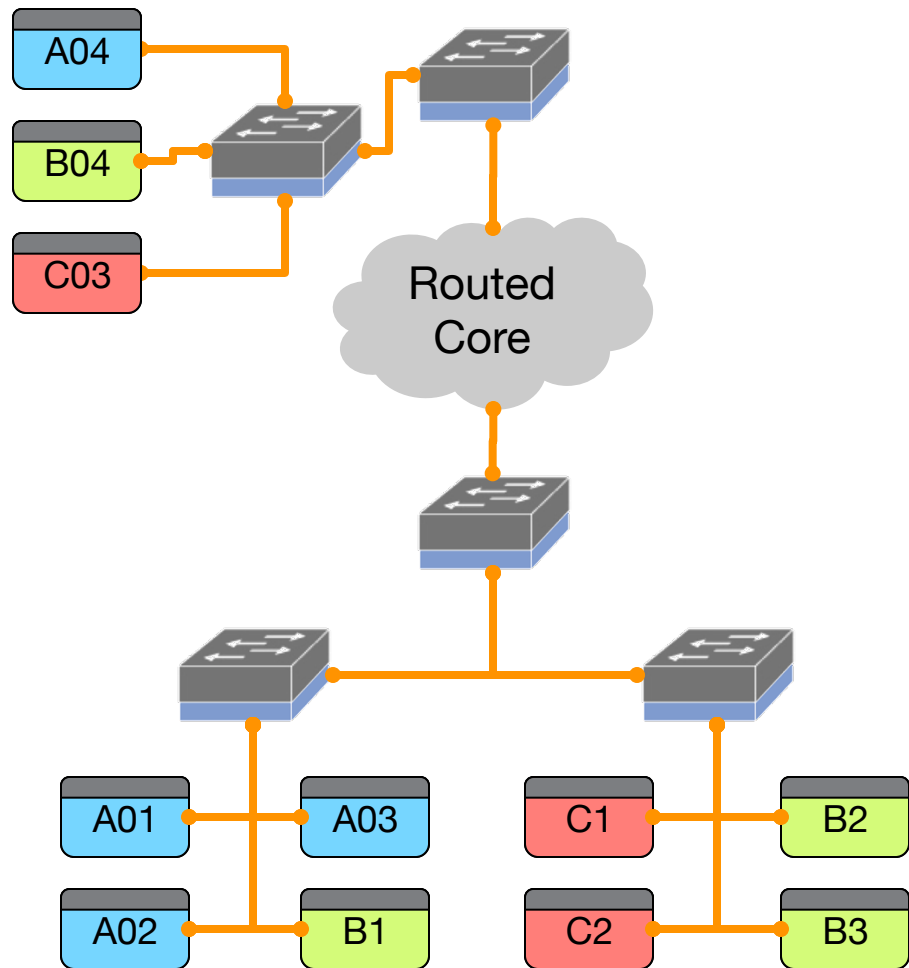
Data Center



NETWORK VIRTUALIZATION

Challenge: Multiple Applications or Tenants

Physical Network



Application 1
Payment Services

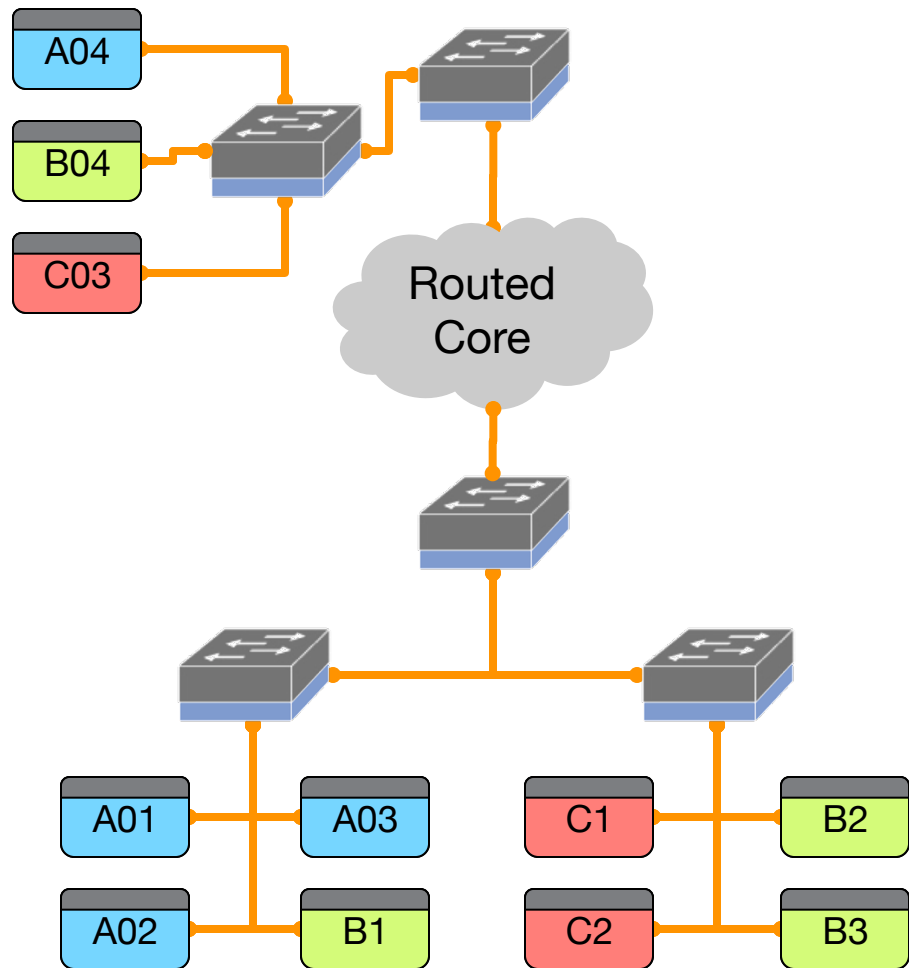
Application 2
Production Intranet

Application 3
Test and Development

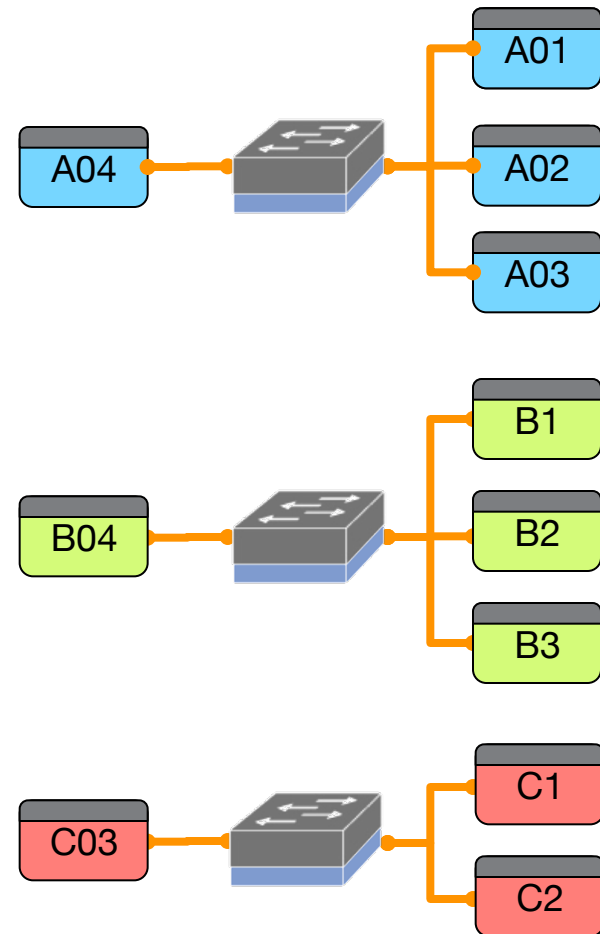
NETWORK VIRTUALIZATION

Challenge: Multiple Applications or Tenants

Physical Network



Virtual Networks



NETWORK VIRTUALIZATION

Very difficult to do with a distributed control plane

- Adding/removing tenants
- VM mobility

Examples for non-SDN designs:

- All solutions require additional information in the packet (e.g. tags)
- VLANs – require configuration of every network node separately
- MPLS – requires complex setup protocols

Even outside of “typical” SDN, centralized controllers are used

- VMware’s distributed vSwitch
- Cisco Nexus 1000V

**SDN is a great approach for building
network virtualization**

APPLICATION INTEGRATION

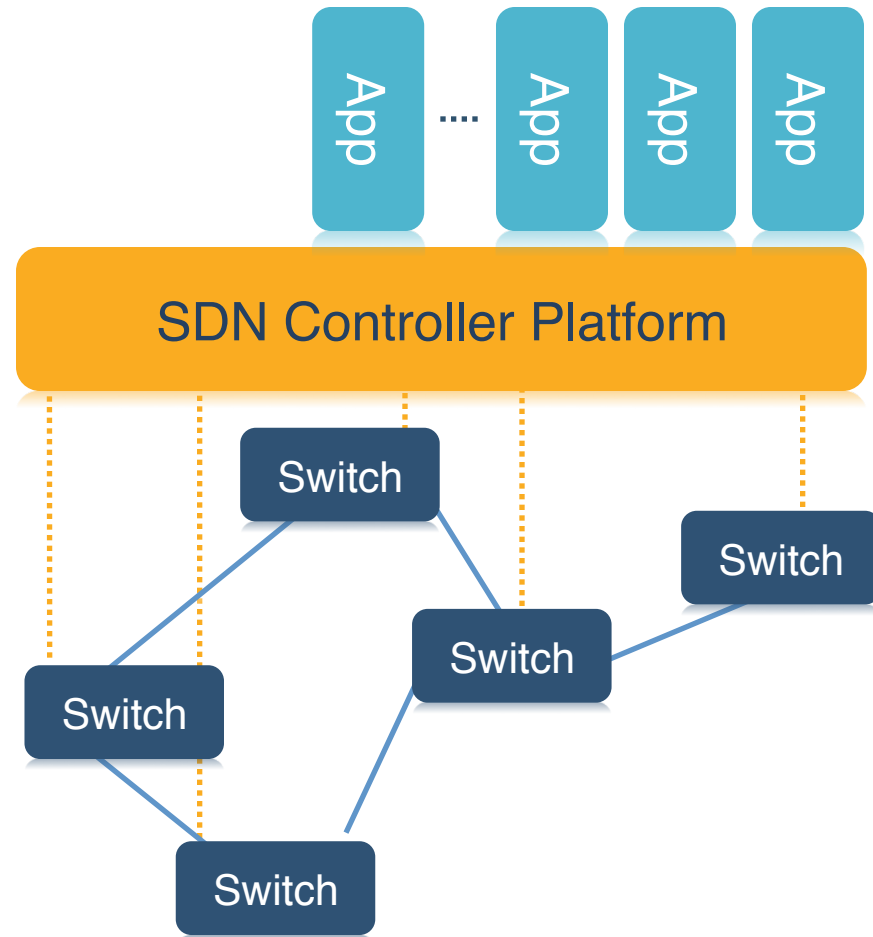
SDN makes much easier to integrate Enterprise Apps with the Network

Integration Matters

- Example: Private Cloud. Goal is one console for network and server provisioning
- Automation key to preserve agility in the networking team

Higher Level Abstractions

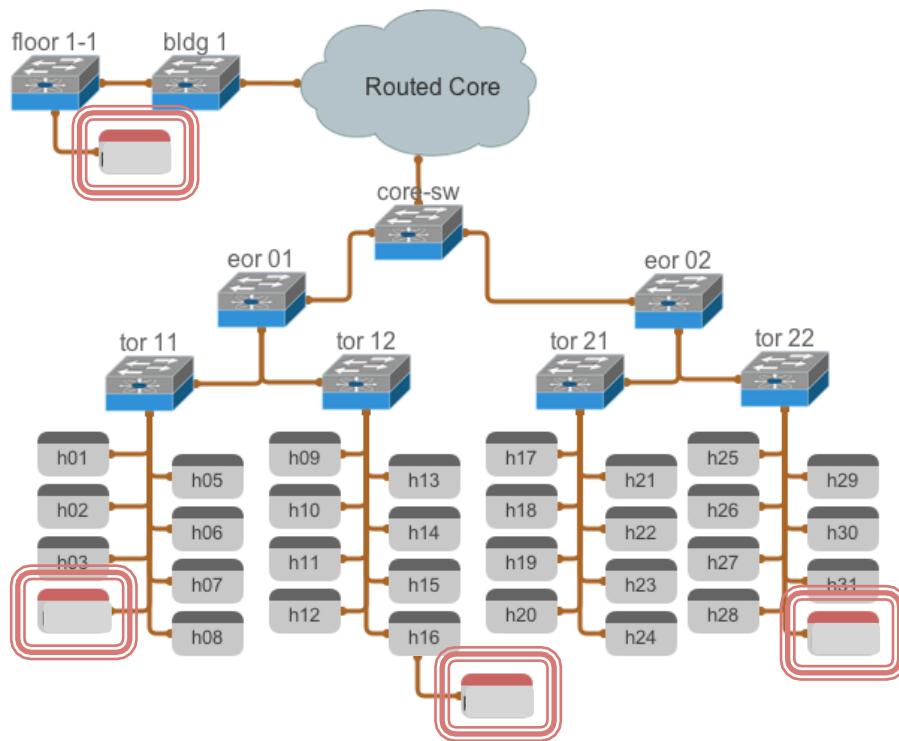
- The SDN Platform provides central visibility and configuration for the network
- Attach an ACL to Host A (independently of its location)
- What bandwidth is available between Hosts A and Host B
- Rollback if an exception occurs?



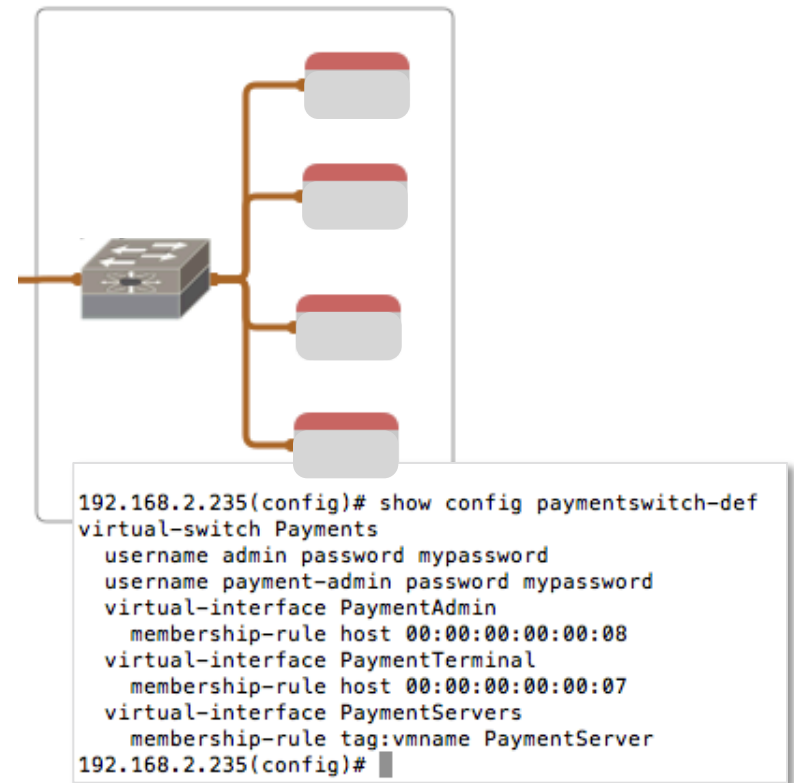
NETWORK DELEGATION

Role-based network administration

For the architect...
a view of the global network

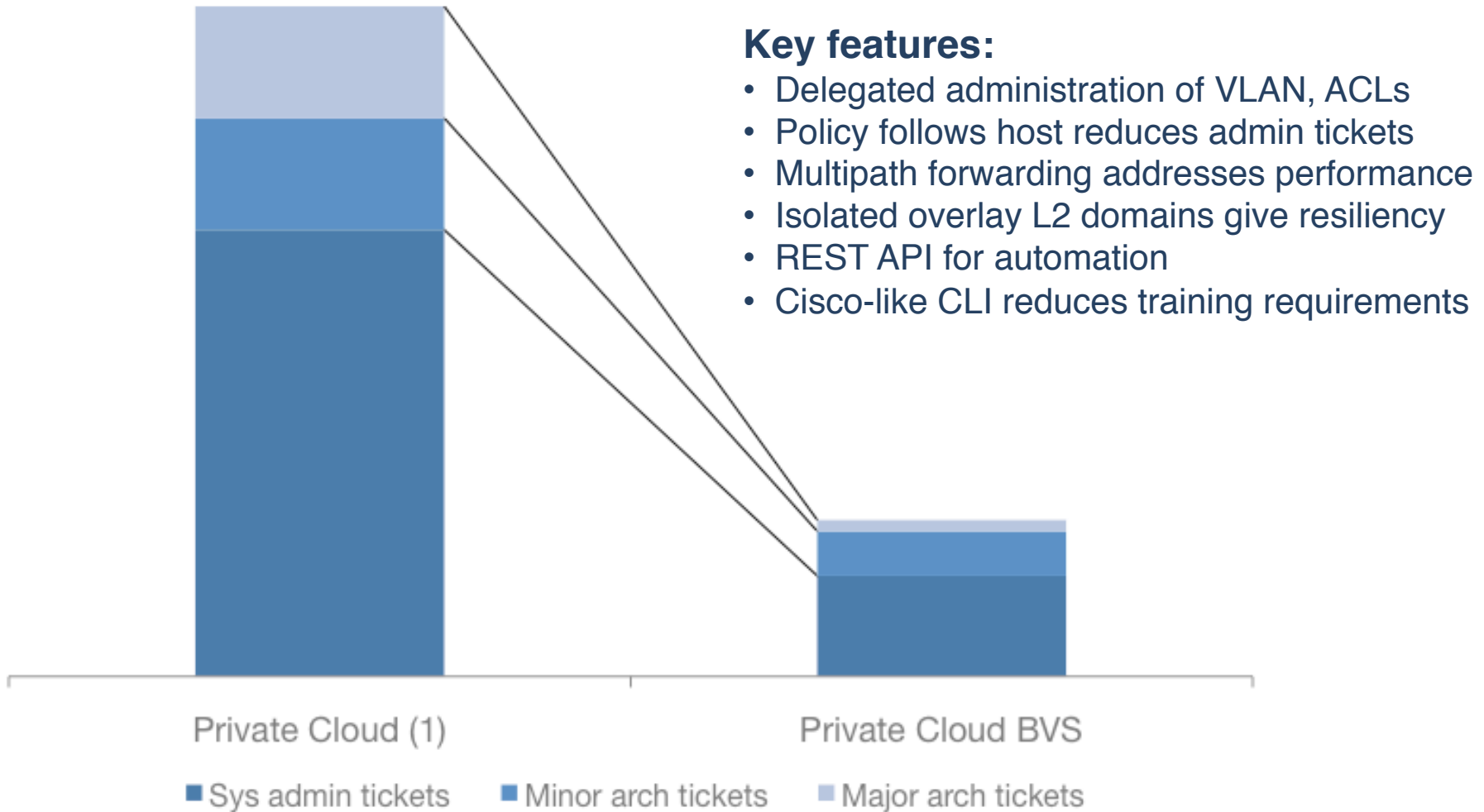


For the team admin...
CLI that feels like a single switch



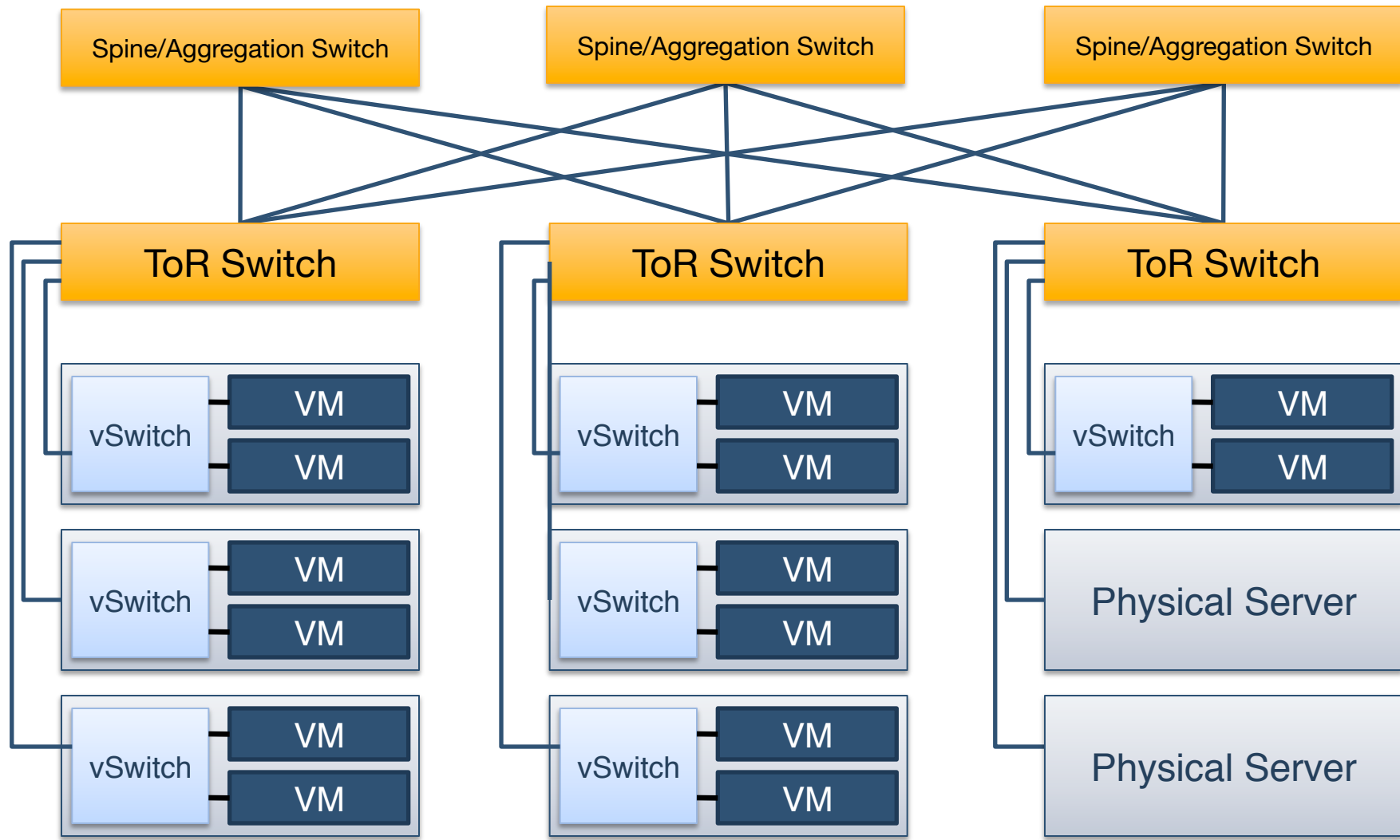
KEY VALUE PROPOSITION: REDUCE OVERHEAD

A set of features required to get this under control



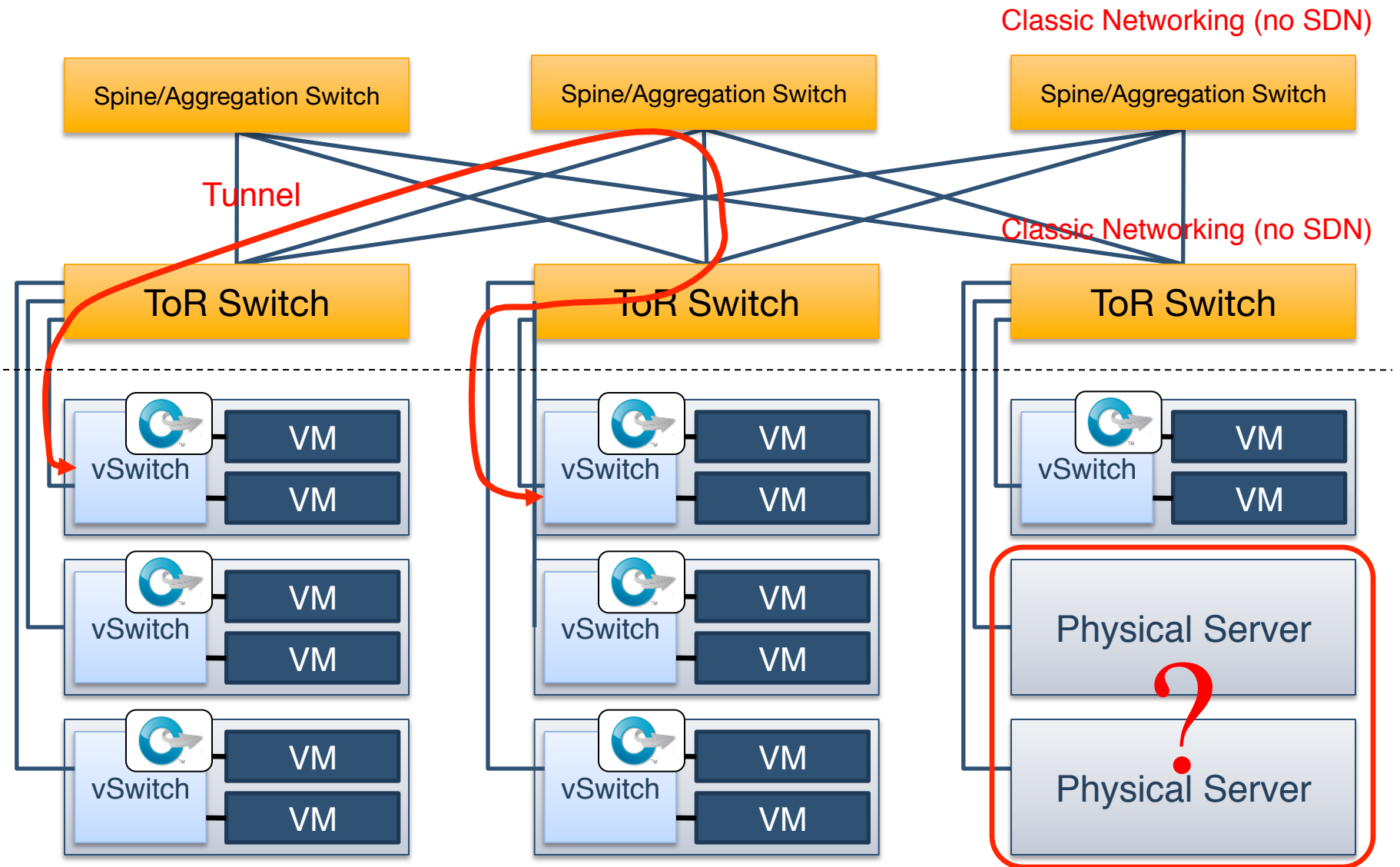
TOPOLOGIES

Enterprise Data Center



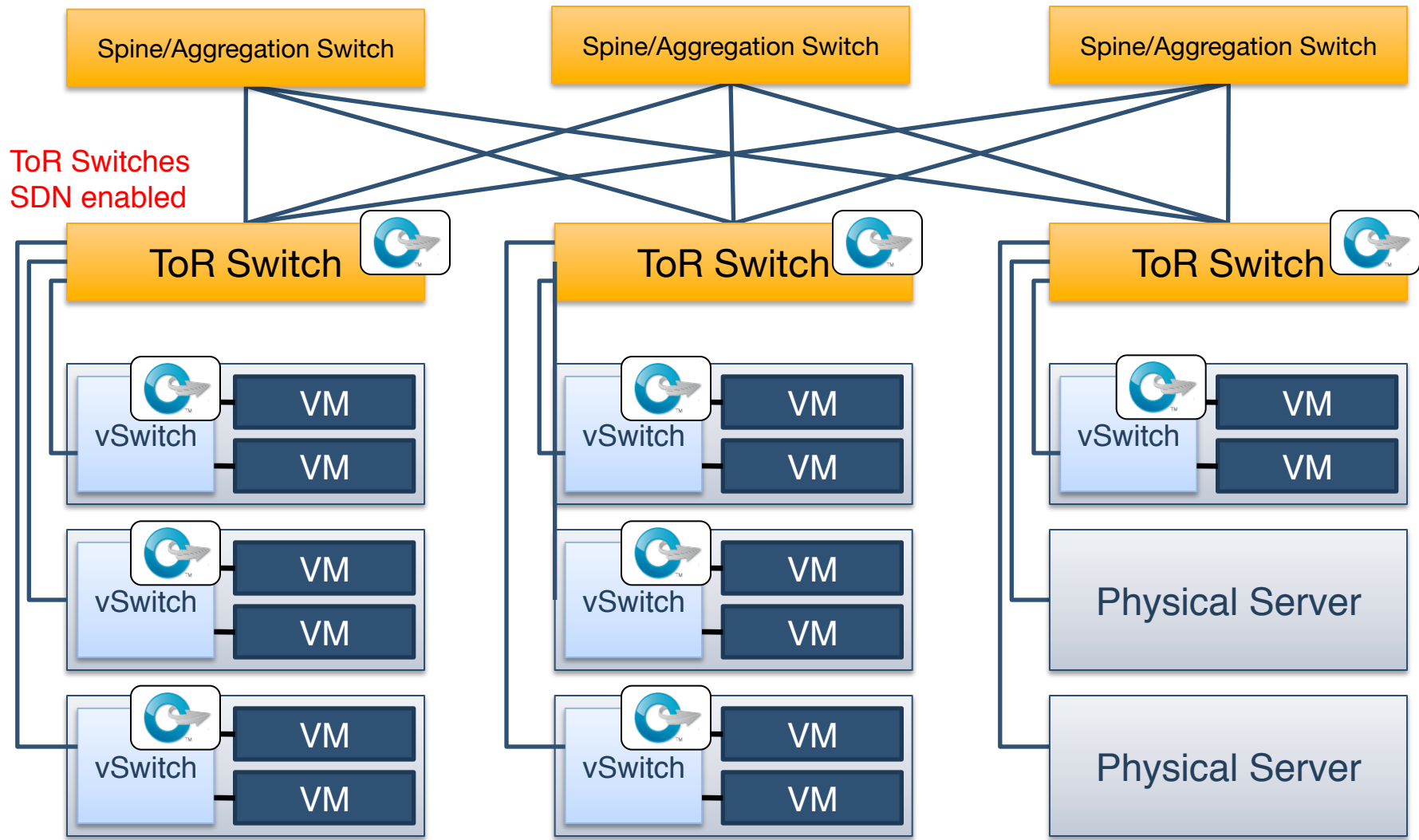
TUNNELING IN THE HYPERVISOR ONLY

This works in some markets, difficult in the enterprise



HYPERVISOR PLUS TOR SWITCHES

Better integration of bare metal servers, middle boxes



OPENFLOW VS SDN

It's the wrong question...

SDN should use any tool available

- OpenFlow with or without Vendor Extensions
- VXLAN, MPLS, VLANs, L2/GRE
- Lots more...

Caveat: Standards Matter

- OpenFlow is currently the standardized SDN control protocol
- Real concerns about vendor lock-in through proprietary technologies

